I CLAIM:

1. An antenna apparatus that generates a plurality of equipotential field lines comprising:
   a) a voltage divider having at least two electrical contacts coupled to it; and
   b) a plurality of spaced apart, low resistance, finger elements coupled to the voltage divider at intervals between the at least two contacts, such that the electrical potential along a long axis of each element is approximately uniform and each finger element radiates at an electric potential that is a function of the potential on the voltage divider where the element is coupled.

2. The apparatus of claim 1 wherein the width of the finger elements varies along the long axis.

3. The apparatus of claim 1 wherein the voltage divider and the plurality of finger elements are disposed on an insulating surface.

4, The apparatus of claim 3 wherein the insulating surface is substantially planar.

5. The apparatus of claim 1 wherein the long axes of the finger elements are substantially straight and parallel.

6. The apparatus of claim 4 wherein the long axes of the finger elements are substantially perpendicular to the line of the voltage divider.

7. The apparatus of claim 1 wherein the long axes of the finger elements are curved.

8. The apparatus of claim 1 wherein the intervals between the finger elements are substantially uniform.

9. The apparatus of claim 1 wherein a difference in electrical potential between adjacent finger elements is substantially constant.

10. The apparatus of claim 1 wherein the voltage divider is a resistive divider.

11. The apparatus of claim 10 wherein the voltage divider is coupled to resistive elements having variable resistance values.

12. The apparatus of claim 11 wherein the variable resistance elements can be tuned to a desired value.

13. The apparatus of claim 11 wherein the voltage divider has more than two electrical contacts and at least distinct two pairs of the electrical contacts couple to a radio frequency driver.

14. An antenna apparatus that generates a plurality of equipotential field lines comprising:

a) a voltage divider shaped in a loop and having at least three electrical contacts at intervals on the loop; and

b) a plurality of spaced apart, low resistance, finger elements coupled to the voltage divider at intervals between each two of the at least three contacts, such that the electrical potential along a long axis of each element is substantially uniform.

15. The apparatus of claim 14 wherein the width of the finger elements varies along the long axis.

16. The apparatus of claim 14 wherein the voltage divider and the plurality of finger elements are disposed on an insulating surface.

17. The apparatus of claim 14 wherein the long axes of the finger elements are substantially congruent with longitudes of an ellipsoidal surface and the voltage divider is substantially along an equator of latitude of an ellipsoidal surface.

18. The apparatus of claim 14 wherein certain of the plurality of finger elements have long axes of one length and other of the plurality of finger elements have long axes of one or more other lengths.

19. The apparatus of claim 14 wherein the intervals between the finger elements, measured along a latitude, are substantially uniform.

20. The apparatus of claim 14 wherein a difference in electrical potential between adjacent finger elements is substantially constant.

21. The apparatus of claim 14 wherein the voltage divider is a resistive divider.

22. The apparatus of claim 21 wherein the voltage divider is coupled to resistive finger elements having variable resistance values.

23. An antenna apparatus that generates a plurality of equipotential field lines comprising:

a) a voltage divider having at least two electrical contacts coupled to it, the voltage divider disposed on the ellipsoidal surface such that it is substantially congruent with a longitude; and

b) a plurality of spaced apart, low resistance, finger elements coupled to the voltage divider at intervals between the at least two contacts, such that the electrical potential along a long axis of each element is substantially uniform and the long axes of the finger elements are substantially congruent with latitudes on the ellipsoidal surface.

24. The apparatus of claim 23 wherein the width of the finger elements varies along the long axis.

25. The apparatus of claim 23 wherein the voltage divider and the plurality of finger elements are disposed on an insulating surface.

26. The apparatus of claim 23 wherein the finger elements encircle an ellipsoidal surface such that each end of the finger elements is coupled to the voltage divider.

27. The apparatus of claim 23 wherein certain of the plurality of finger elements have long axes of one length and other of the plurality of finger elements have long axes of one or more other lengths.

28. The apparatus of claim 23 wherein the azimuthal intervals between the finger elements are substantially uniform.

29. The apparatus of claim 23 wherein a difference in electrical potential between adjacent finger elements is substantially constant.

30. The apparatus of claim 23 wherein the long axes of the finger elements are oriented at substantially a constant angle with a latitude of the ellipsoidal surface.

31. The apparatus of claim 23 wherein the voltage divider is a resistive divider.

32. The apparatus of claim 31 wherein the voltage divider is coupled to resistive elements having variable resistance values.

33. An antenna apparatus comprising:

a) a first antenna and a second antenna separated by an electrical insulator;

b) the first antenna comprising,

i) a first voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts; and

c) the second antenna comprising,

i) a second voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the second voltage divider between the at least two electrical contacts;

wherein the first antenna is oriented so that the finger elements of the first antenna overlay a portion of the finger elements of the second antenna; and an angle between the finger elements of the first antenna and the finger elements of the second antenna is between 0° and 180°.

34. The apparatus of claim 33 wherein the width of the finger elements varies along an element's length.

35. The apparatus of claim 33 wherein the first antenna is disposed on a first side of an insulating surface and the second antenna is disposed on a second side of an insulating surface.

36. The apparatus of claim 33 wherein the first voltage divider has a linear shape.

37. The apparatus of claim 33 wherein the second voltage divider has a linear shape.

38. The apparatus of claim 36 wherein the second voltage divider has a linear shape.

39. The apparatus of claim 38 wherein the long axes of the finger elements are substantially straight.

40. The apparatus of claim 39 wherein the finger elements of the first antenna are substantially orthogonal to the line of the first voltage divider, and the first voltage divider and finger elements lie substantially in a plane.

41. The apparatus of claim 40 wherein the finger elements of the second antenna are substantially orthogonal to the line of the second voltage divider, and the second voltage divider and finger elements lie substantially in a plane.

42. The apparatus of claim 41 wherein the first antenna is disposed on a first side of an insulating surface and the second antenna is disposed on a second side of an insulating surface.

43. The apparatus of claim 41 wherein the first voltage divider is positioned to be substantially orthogonal to the second voltage divider.

44. The apparatus of claim 33 wherein,

a) the first antenna is disposed on a first side of a first insulating surface;

b) the second antenna is disposed on a first side of a second insulating surface; and

c) the second antenna is positioned adjacent to a second side of the first insulating surface.

45. The apparatus of claim 33 wherein the first voltage divider has a substantially linear shape and the long axes of the finger elements coupled to the first voltage divider are curved.

46. The apparatus of claim 45 wherein the second voltage divider has a substantially linear shape and the long axes of the finger elements coupled to the second voltage divider are curved.

47. The apparatus of claim 33 wherein the intervals between the finger elements are substantially uniform.

48. The apparatus of claim 33 wherein a difference in electrical potential between adjacent finger elements is substantially constant.

49. The apparatus of claim 33 wherein one or both of the voltage dividers are resistive dividers.

50. The apparatus of claim 49 wherein one or both of the voltage dividers are coupled to resistive elements having variable resistance values.

51. An antenna apparatus comprising:

a) a first antenna and a second antenna separated by an electrical insulator;

b) the first antenna comprising,

i) a first voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts; and

c) the second antenna comprising,

i) a second voltage divider formed in a loop and having at least three electrical contacts at intervals along the loop,

ii) a plurality of spaced apart, low resistance, finger elements coupled to the second voltage divider at intervals between each two of the at least three contacts, such that the electrical potential along a each element is substantially uniform and the finger elements are oriented at a substantially a constant angle with a tangent of the loop where each element couples to the loop;

wherein the first antenna is oriented so that the finger elements of the first antenna overlay a portion of the finger elements of the second antenna; and an angle between the finger elements of the first antenna and the finger elements of the second antenna is between 0° and 180°.

52. The apparatus of claim 51 wherein the width of the finger elements varies along an finger element's length.

53. The apparatus of claim 51 wherein the first antenna is disposed on a first side of an insulating surface and the second antenna is disposed on a second side of an insulating surface.

53. The apparatus of claim 51 wherein the first voltage divider has a linear shape.

54. The apparatus of claim 51 wherein the second voltage divider has a circular shape.

55. The apparatus of claim 53 wherein the second voltage divider has a circular shape.

56. The apparatus of claim 55 wherein the first antenna finger elements are substantially orthogonal to the line of the first voltage divider, and the first voltage divider and finger elements lie substantially on an ellipsoidal surface.

57. The apparatus of claim 56 wherein the first antenna finger elements lie substantially on geodetic latitudes.

58. The apparatus of claim 56 wherein the ellipsoidal surface is substantially spherical.

59. The apparatus of claim 55 wherein the finger elements of the second antenna are substantially normal to the circle of the second voltage divider, and the second voltage divider and finger elements lie substantially on an ellipsoidal surface.

60. The apparatus of claim 59 wherein the finger elements of the second antenna lie substantially on longitudes of the ellipsoidal surface.

61. The apparatus of claim 59 wherein the ellipsoidal surface is substantially spherical.

62. The apparatus of claim 51 wherein the first voltage divider is substantially congruent with a longitude and the second voltage divider is substantially congruent with a latitude.

63. The apparatus of claim 62 wherein the second voltage divider is substantially congruent with an equator.

64. The apparatus of claim 51 wherein one or both of the voltage dividers are resistive dividers.

65. The apparatus of claim 64 wherein one or both of the voltage dividers are coupled to resistive elements having variable resistance values.

66. An electrographic position sensing system comprising:

a) a first transmitting antenna and a second transmitting antenna separated by an electrical insulator;

the first antenna comprising,

i) a first voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts; and

the second antenna comprising,

i) a second voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the second voltage divider between the at least two electrical contacts;

wherein the first antenna is oriented so that the finger elements of the first antenna overlay a portion of the finger elements of the second antenna; and the finger elements of the first antenna form a non-zero angle with the finger elements of the second antenna.

b) a processor coupled to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at two or more electrical contacts;

c) a receiving antenna coupled to the processor.

67. The apparatus of claim 66 wherein the finger elements of the first antenna are substantially orthogonal to the finger elements of the second antenna.

68. The apparatus of claim 66 wherein the first antenna is disposed on a first side of an insulating surface and the second antenna is disposed on a second side of an insulating surface and the area defined by the finger elements of the first antenna essentially entirely overlays the area defined by the finger elements of the second antenna.

69. The apparatus of claim 66 wherein the first and second antennas and the insulating sheet are substantially planar.

70. The apparatus of claim 66 further comprising a drive signal transmitter coupled to the processor and coupled to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at two or more electrical contacts, the transmitter.

71. The apparatus of claim 70 further comprising an amplifier coupled between the drive signal transmitter and each electrical contact of the first and second voltage divider to which the transmitter is coupled.

72. The apparatus of claim 70 further comprising a signal receiver coupled between the receiving antenna and the processor.

73. The apparatus of claim 72 further comprising a signal detector coupled between the receiving antenna and the signal receiver, the signal receiver further coupled to the drive signal transmitter.

74. The apparatus of claim 73 wherein the signal detector comprises a signal integrator, a signal demodulator, and an analog-to-digital converter.

75. The apparatus of claim 74 further comprising a receiving amplifier coupled between the receiving antenna and the signal detector.

76. The apparatus of claim 75 wherein the receiving amplifier has gain, filter, and DC rejection circuits.

77. The apparatus of claim 76 wherein the receiving antenna is coupled to the signal detector and signal receiver by an electronically shielded electronic lead, the lead having sufficient length for the receiving antenna to be located at any point directly over the transmitting antennas.

78. The apparatus of claim 77 wherein the processor has a program which causes a Five State Drive Algorithm to be applied to the first antenna and second antenna, and which subsequently calculates the position of the receiving antenna based on the signals obtained from the receiving antenna during the application of the Five State Drive Algorithm.

79. The apparatus of claim 69 wherein the insulator and transmitting antennas are disposed on a surface such that the first antenna resides on top of the insulating sheet and the second antenna resides on the bottom of the insulating sheet.

80. The apparatus of claim 79 wherein the finger elements of the first, top, transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the second, bottom, transmitting antenna.

81. The apparatus of claim 80 wherein the second, bottom, transmitting antenna is oriented such that the bottom finger elements cross the top transmitting antenna finger elements where the top finger elements are narrow.

82. The apparatus of claim 79 wherein the finger elements of the bottom transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the top transmitting antenna.

83. The apparatus of claim 82 wherein the top transmitting antenna is oriented such that its finger elements cross the bottom transmitting antenna finger elements where the bottom finger elements are narrow.

84. The apparatus of claim 81 wherein the finger elements of the bottom transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the top transmitting antenna.

85. The apparatus of claim 84 wherein the top transmitting antenna is oriented such that its finger elements cross the bottom transmitting antenna finger elements where the bottom finger elements are narrow.

86. The apparatus of claim 85 further comprising a rigid substantially planar surface placed over the transmitting antennas.

87. The apparatus of claim 120 further comprising the receiving antenna disposed in a pointing stylus and coupled to the signal detector and signal receiver by an electronically shielded electronic lead, the lead having sufficient length for the stylus be located at any point directly over the transmitting antennas.

88. The apparatus of claim 87 wherein the processor has a program which causes a Five State Drive Algorithm to be applied to the first antenna and second antenna, and which subsequently calculates the position of the receiving antenna based on the signals obtained from the receiving antenna during the application of the Five State Drive Algorithm.

89. The apparatus of claim 88 further comprising a programmable memory coupled to the processor.

90. The apparatus of claim 89 further comprising one or more documents having symbols, images, or graphical patterns on them, their location stored in the programmable memory, such that when the stylus is placed over a symbol, image, or graphical pattern, the processor causes the position of the stylus to be calculated and relates the stylus position to the symbol, image, or graphical pattern under the stylus.

91. An electrographic position sensing system comprising:

a) a first transmitting antenna and a second transmitting antenna separated by an electrical insulator;

the first antenna comprising,

i) a first voltage divider having at least two electrical contacts coupled to it; and

ii) a plurality of spaced apart, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts; and

the second antenna comprising,

i) a second voltage divider shaped in a loop and having at least three electrical contacts at intervals along the loop, and

ii) a plurality of spaced apart, low resistance, finger elements coupled to the second voltage divider at intervals between each two of the at least three contacts, such that the electrical potential along a each element is substantially uniform and the elements are oriented at a substantially a constant angle with a tangent of the loop where each element couples to the loop;

wherein the first antenna is oriented so that the finger elements of the first antenna overlay a portion of the finger elements of the second antenna; and the finger elements of the first antenna form a non-zero angle with the finger elements of the second antenna.

b) a processor coupled to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at three or more electrical contacts;

c) a receiving antenna coupled to the processor.

92. The apparatus of claim 91 wherein the finger elements of the first antenna are substantially orthogonal to the finger elements of the second antenna.

93. The apparatus of claim 91 wherein the first antenna is disposed on a first side of an insulating surface and the second antenna is disposed on a second side of an

insulating surface and the area defined by the finger elements of the first antenna essentially entirely overlays the area defined by the finger elements of the second antenna.

94. The apparatus of claim 91 wherein the first and second antennas and the insulating sheet are substantially on an ellipsoidal surface.

95. The apparatus of claim 94 wherein:

a) the ellipsoidal surface is a spherical or hemispherical surface;

b) the voltage divider of the first antenna lies substantially along a longitude of the spherical or hemispherical surface;

c) the finger elements of the first antenna substantially circle the spherical or hemispherical surface on latitudes;

d) the voltage divider of the second antenna lies substantially on an equator or latitude of the spherical or hemispherical surface; and

e) the finger elements of the second antenna lie substantially along longitudes of the spherical or hemispherical surface.

96. The apparatus of claim 95 further comprising a drive signal transmitter coupled to the processor and coupled to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at three or more electrical contacts, the transmitter capable of receiving commands from the processor and transmitting signals to the first and second voltage dividers independently.

97. The apparatus of claim 95 further comprising an amplifier coupled between the drive signal transmitter and each electrical contact of the first and second voltage divider to which the transmitter is coupled.

98. The apparatus of claim 97 further comprising a signal receiver coupled between the receiving antenna and the processor, the signal receiver capable of receiving measured signal data from the receiving antenna and transmitting the data to the processor.

99. The apparatus of claim 98 further comprising a signal detector coupled between the receiving antenna and the signal receiver, the signal receiver further coupled to the

drive signal transmitter, wherein the signal receiver is capable of synchronizing the received signal data with timing data obtained from the drive signal transmitter.

100. The apparatus of claim 99 wherein the signal detector comprises a signal integrator, a signal demodulator, and an analog-to-digital converter.

101. The apparatus of claim 100 further comprising a receiving amplifier coupled between the receiving antenna and the signal detector.

102. The apparatus of claim 101 wherein the receiving amplifier has gain, filter, and DC rejection circuits.

103. The apparatus of claim 102 wherein the receiving antenna is coupled to the signal detector and signal receiver by an electronically shielded electronic lead, the lead having sufficient length for the receiving antenna to be located at any point directly over the transmitting antennas.

104. The apparatus of claim 103 wherein the processor has a program which causes a Six State Drive Algorithm to be applied to the first antenna and second antenna, and which subsequently calculates the position of the receiving antenna based on the signals obtained from the receiving antenna during the application of the Six State Drive Algorithm.

105. The apparatus of claim 95 wherein the insulator and transmitting antennas are disposed on a surface such that the first antenna resides on top of the insulating sheet and the second antenna resides on the bottom of the insulating sheet.

106. The apparatus of claim 105 wherein the finger elements of the first, top, transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the second, bottom, transmitting antenna.

107. The apparatus of claim 106 wherein the second, bottom, transmitting antenna is oriented such that the bottom finger elements cross the top transmitting antenna finger elements where the top finger elements are narrow.

108. The apparatus of claim 105 wherein the finger elements of the bottom transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the top transmitting antenna.

109. The apparatus of claim 108 wherein the top transmitting antenna is oriented such that its finger elements cross the bottom transmitting antenna finger elements where the bottom finger elements are narrow.

110. The apparatus of claim 107 wherein the finger elements of the bottom transmitting antenna have a width that narrows at intervals that match the distance between the finger elements of the top transmitting antenna.

111. The apparatus of claim 110 wherein the top transmitting antenna is oriented such that its finger elements cross the bottom transmitting antenna finger elements where the bottom finger elements are narrow.

112. The apparatus of claim 111 further comprising a rigid substantially hemispherical surface placed over the transmitting antennas.

113. The apparatus of claim 112 further comprising the receiving antenna disposed in a pointing stylus and coupled to the signal detector and signal receiver by an electronically shielded electronic lead, the lead having sufficient length for the stylus be located at any point directly over the transmitting antennas.

114. The apparatus of claim 113 wherein the processor has a program which causes a Six State Drive Algorithm to be applied to the first antenna and second antenna, and which subsequently calculates the position of the receiving antenna based on the signals obtained from the receiving antenna during the application of the Six State Drive Algorithm.

115. The apparatus of claim 114 further comprising a programmable memory coupled to the processor.

116. The apparatus of claim 115 wherein the hemispherical surface placed over the transmitting antennas has symbols, images, or graphical patterns on it, their location stored in the programmable memory, such that when the stylus is placed over a

symbol, image, or graphical pattern, the processor causes the position of the stylus to be calculated and relates the stylus position to the symbol, image, or graphical pattern under the stylus.

117. The apparatus of claim 116 wherein one or more hemispherical surfaces having symbols, images, or graphical patterns on them are placed over the transmitting antennas.

118. A method for locating a user selected position over an antenna apparatus comprising the steps of:

a) providing a first transmitting antenna, the first antenna comprising a first voltage divider having at least two electrical contacts coupled to it, and a plurality of spaced apart, substantially parallel, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts;

b) providing an electrical insulator to separate the first transmitting antenna from a second transmitting antenna;

c) providing the second transmitting antenna comprising a second voltage divider having at least two electrical contacts coupled to it, and a plurality of spaced apart, substantially parallel, electrically conductive, finger elements coupled to the second voltage divider between the at least two electrical contacts, the second transmitting antenna oriented so that the area defined by its finger elements overlay a portion of the area defined by the finger elements of the second antenna, and the finger elements of the first antenna form a non-zero angle with the finger elements of the second antenna;

d) providing a processor coupled to a user interface and further coupled through other electronics to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at two or more electrical contacts;

e) providing a drive signal transmitter coupled between the processor and through amplifiers to the first voltage divider at two or more electrical contacts and through amplifiers to the second voltage divider at two or more electrical contacts, the transmitter capable of receiving commands from the

processor and transmitting signals to the first and second voltage dividers independently;

f) providing a receiving antenna coupled to an amplifier, the amplifier coupled to the processor;

g) providing a signal detector coupled between the receiving antenna amplifier and the processor;

h) providing a signal receiver coupled between the signal detector and the processor, the signal receiver further coupled to the drive signal transmitter;

i) placing the receiving antenna at a position over the area where the finger elements of the first and second antenna overlap;

j) causing the processor to send commands to the drive signal transmitter, the commands causing the transmitter to send a sequence of five drive-signal states to the to the first and second voltage dividers independently, the five states being:

   i) applying zero voltage to the first and the second voltage dividers;

   ii) applying a gradient voltage to the voltage divider of the first, top, antenna and zero voltage to the second, bottom, antenna;

   iii) applying a constant voltage to the voltage divider of the first, top, antenna and zero voltage to the second, bottom, antenna;

   iv) applying a gradient voltage to the voltage divider of the second, bottom, antenna and zero voltage to the first, top, antenna; and

   v) applying a constant voltage to the voltage divider of the second, bottom, antenna and zero voltage to the first, top, antenna;

k) receiving a signal measurement from the receiving antenna during each drive state;

l) detecting a magnitude of the measured signal data from the receiving antenna and sending to the signal receiver;

m) synchronizing the received signal data with timing data obtained from the drive signal transmitter; and

n) calculating the position of the receiving antenna from the measured signal data.

119. The method of claim 118 wherein the position of the receiving antenna is calculated according the following steps:

a) subtracting the signal magnitude data measured at state (i) from the signal magnitude measured at each of the four other states, to yield:

P_{Top-G} = the signal magnitude measure at state (ii) less the signal magnitude data measured at state (i);

P_{Top-C} = the signal magnitude measure at state (iii) less the signal magnitude data measured at state (i);

$P_{Bottom-G}$ = the signal magnitude measure at state (iv) less the signal magnitude data measured at state (i);

$P_{Bottom-C}$ = the signal magnitude measure at state (v) less the signal magnitude data measured at state (i);

b) obtaining a single data point relating to the measurements taken from the top antenna, P_{Top}, by calculating the ratio of P_{Top-G} /P_{Top-C} ;

c) obtaining a single data point relating to the measurements taken from the bottom antenna, P_{Bottom}, by calculating the ratio of $P_{Bottom-G}$ /$P_{Bottom-C}$;and

d) determining the positional meaning of P_{Top} and P_{Bottom} based on a model of a field radiated by the transmitting antennas.

120. The method of claim 119 wherein the position of the receiving antenna is calculated by the additional step of compensating for variance in resistance in each voltage divider after P_{Top} and P_{Bottom} are calculated.

121. A method for locating a user selected position over an antenna apparatus wherein one antenna has a loop voltage divider, comprising the steps of:

a) providing a first transmitting antenna, the first antenna comprising a first voltage divider having at least two electrical contacts coupled to it, the first, and a plurality of spaced apart, electrically conductive, finger elements coupled to the first voltage divider between the at least two electrical contacts;

b) providing an electrical insulator to insulate the components of the first transmitting antenna from a second transmitting antenna;

c) providing the second transmitting antenna, the second antenna comprising a second voltage divider shaped in a loop and having at least three electrical contacts at intervals along the loop, and a plurality of spaced apart, low resistance, finger elements coupled to the second voltage divider at intervals between each two of the at least three contacts, such that the electrical potential along a each element is substantially uniform and the elements are oriented at a substantially a constant angle with a tangent of the loop where each element couples to the loop;

d) orienting the finger elements of the first antenna to define the area enclosed by the loop of the second voltage divider, and orienting the fingers of the second antenna to lie within the loop of the second voltage divider, wherein the first antenna is oriented so that the area defined by the finger elements of the first antenna overlay a portion of the area defined by the finger elements of the second antenna; and the finger elements of the first antenna form a non-zero angle with the finger elements of the second antenna;

e) providing a processor coupled to a user interface and further coupled through other electronics to the first voltage divider at two or more electrical contacts and coupled to the second voltage divider at three or more electrical contacts;

f) providing a drive signal transmitter coupled to the processor and through amplifiers to the first voltage divider at two or more electrical contacts and coupled through amplifiers to the second voltage divider at three or more electrical contacts, the transmitter capable of receiving commands from the processor and transmitting signals to the first and second voltage dividers independently;

g) providing a receiving antenna coupled to an amplifier, the amplifier coupled to the processor;

h) providing a signal detector coupled between the receiving antenna amplifier and the processor;

i) providing a signal receiver coupled between the signal detector and the processor, the signal receiver further coupled to the drive signal transmitter;

j) placing the receiving antenna at a position over the area where the finger elements of the first and second antenna overlap;

k) causing the processor to send commands to the drive signal transmitter, the commands causing the transmitter to send a sequence of six drive-signal states to the to the first and second voltage dividers independently, the six states being:

   i) applying zero voltage to the first and the second voltage dividers;

   ii) applying a gradient voltage to the voltage divider of the first, top, antenna and zero voltage to the second, bottom, antenna;

   iii) applying a constant voltage to the voltage divider of the first, top, antenna and zero voltage to the second, bottom, antenna;

   iv) applying a first gradient voltage to two or more of the at least three contacts of the voltage divider of the second, bottom, antenna and applying zero voltage to the first, top, antenna;

   v) applying a second gradient voltage to two or more of the at least three contacts of the voltage divider of the second, bottom, antenna and applying zero voltage to the first, top, antenna;

   vi) applying a constant voltage to the voltage divider of the second, bottom, antenna and zero voltage to the first, top, antenna;

l) receiving a signal measurement from the receiving antenna during each drive state;

m) detecting a magnitude of the measured signal data from the receiving antenna and sending to the signal receiver;

n) synchronizing the received signal data with timing data obtained from the drive signal transmitter; and

o) calculating the position of the receiving antenna from the measured signal data.

122. The method of claim 121 wherein the position of the receiving antenna is calculated according the following steps:

a) subtracting the signal magnitude data measured at state (i) from the signal magnitude measured at each of the five other states, to yield:

$P_{Top\text{-}G}$ = the signal magnitude measure at state (ii) less the signal magnitude data measured at state (i);

$P_{Top\text{-}C}$ = the signal magnitude measure at state (iii) less the signal magnitude data measured at state (i);

$P_{Bottom\text{-}G1}$ = the signal magnitude measure at state (iv) less the signal magnitude data measured at state (i);.

$P_{Bottom\text{-}G2}$ = the signal magnitude measure at state (v) less the signal magnitude data measured at state (i);

$P_{Bottom\text{-}C}$ = the signal magnitude measure at state (vi) less the signal magnitude data measured at state (i);

b) obtaining a single data point relating to the measurements taken from the top antenna, P_{Top}, by calculating the ratio of $P_{Top\text{-}G}$ /$P_{Top\text{-}C}$;

c) obtaining two data points relating to the measurements taken from the bottom antenna, $P_{Bottom\text{-}G1}$ and $P_{Bottom\text{-}G2}$ by calculating the ratios of $P_{Bottom\text{-}G1}/P_{Bottom\text{-}C}$ and $P_{Bottom\text{-}G2}$ /$P_{Bottom\text{-}C}$ respectively; and

d) determining the positional meaning of P_{Top}, $P_{Bottom\text{-}G2}$, and $P_{Bottom\text{-}G1}$, based on a model of a field radiated by the transmitting antennas.

123. The method of claim 122 wherein the position of the receiving antenna is calculated by the additional step of compensating for variance in resistance in each voltage divider after P_{Top} and P_{Bottom} are calculated.

124. The method of claim 121 further comprising the step of shaping the first and second transmitting antennas and insulator substantially into a hemisphere and orienting the finger elements of the first antenna to substantially encircle the hemisphere along a latitude and orienting the fingers of the second antenna to substantially lie along longitudes of the hemisphere.